

Table of Contents

CHAPTER 11 HALF-CELL TESTING 2

 SECTION 11.1 INTRODUCTION..... 2

 SECTION 11.2 APPLICATIONS AND LIMITATIONS..... 3

Table of Figures

Figure 6:11-1: Basic Half-Cell Test Configuration 2

CHAPTER 11 HALF-CELL TESTING

SECTION 11.1 INTRODUCTION

Steel reinforcement is typically protected from corrosion by the alkaline nature of concrete. If the alkalinity of the concrete is compromised, corrosion on the steel will commence if moisture and oxygen are present. The corrosion reaction will promote anodic and cathodic activity along the reinforcing steel. The corrosion of the reinforcement produces a corrosion cell caused by these differences in electrical potential.

The half-cell testing method is used to determine if the reinforcing steel is under active corrosion. This method utilizes a multimeter to measure the potential difference between the steel and a half-cell apparatus. The analysis of the potential difference can indicate if active corrosion is taking place on the reinforcing steel. Refer to Figure 6:11-1 for a schematic of a basic half-cell test.

This test is described in the American Society for Testing and Materials (ASTM) publication C876-91, "Standard Test Method for 'Half-Cell' Potentials of Reinforcing Steel in Concrete."

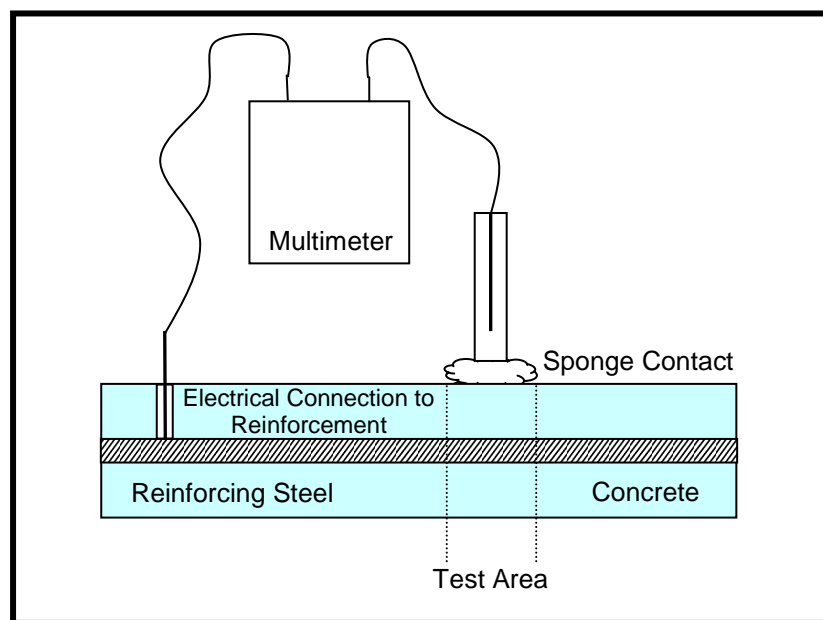


Figure 6:11-1: Basic Half-Cell Test Configuration

SECTION 11.2 APPLICATIONS AND LIMITATIONS

Although commonly used on bridge decks, the half-cell test can be performed on any reinforced concrete component, provided a direct electrical connection can be made to the reinforcing steel. Since the test can only detect corrosion directly under the device, a systematic grid of test points should be created to map the potential readings throughout the concrete component. This map can then be analyzed to determine the probable areas of active corrosion.

It is generally agreed that the potential measurements can be interpreted as follows:

- 0.00 to -0.20 volts indicates greater than 90 percent probability of no corrosion
- -0.20 to -0.35 volts indicates that corrosion is uncertain
- < -0.35 volts indicates greater than 90 percent probability that corrosion is occurring
- Positive number indicates that the moisture content of the concrete is insufficient and, therefore, test is not valid

Half-cell testing requires specialized equipment, typically including a copper/copper-sulfate half-cell apparatus and a multimeter. A connection with the reinforcing steel is required, so holes may need to be drilled in the concrete to connect to the steel. This test method only indicates the probability of corrosion present at the time of testing and does not indicate the extent or the rate of corrosion. Traffic control, access to electricity, and tools such as drills are required to perform this testing.